

## ***E. Fisheries and Wildlife***

Until recent decades, the vast majority of Mashpee's territory was the domain not of man, but of beast. Our woods were only occasionally broken by a roadway, or a few homes, or a farmer's fields. The hunting was good. Our clear lakes were famous for their fishing. Our streams flowed clean to pristine coastal bays teeming with fish and shellfish that helped feed and support many families.

Much has changed with the explosive development of the last fifty years, and much of our wildlife has disappeared along with the natural habitat that supported it. However, much remains for our enjoyment and safekeeping. In this section we will look at Mashpee's fish and shellfish, its mammals, birds and insects, important wildlife movement corridors and those species living in our town which are among the last of their kind.

### **1. Finfish**

Mashpee hosts four types of fin fisheries: fresh water ponds, rivers and streams, estuaries and coastal ponds and the open ocean.

Our four large ponds provide some of the best fishing in the state. 203-acre Ashumet Pond, 317-acre Johns Pond and 729-acre Mashpee-Wakeby Pond are all cold water fisheries stocked with brown, brook and rainbow trout. In the last century, such famous anglers as Daniel Webster, President Grover Cleveland and the famous actor Joseph Jefferson looked forward to their fishing expeditions to Mashpee, while local residents looked forward to the income provided serving as guides to those and other wealthy gentlemen. Ashumet and Johns Ponds are also noted for their smallmouth bass, while Mashpee-Wakeby provides not only the smallmouth, but also chain pickerel, white perch and yellow perch. Its waters host over thirty fishing tournaments annually.

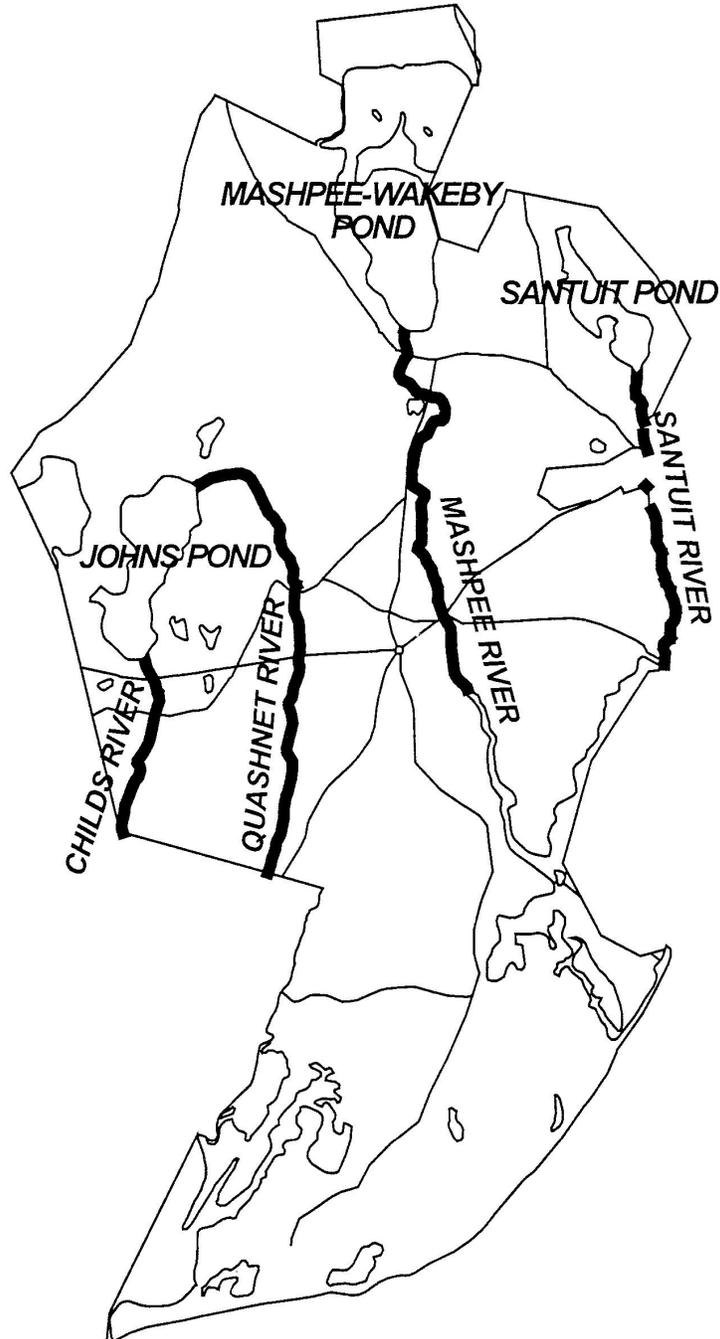
Santuit Pond, a shallow 166-acre warm water fishery, offers chain pickerel, record-setting yellow perch and brown bullheads.

All but Ashumet Pond also serve as nurseries for the alewife and blueback herring, which run up to Mashpee and Santuit Ponds via their namesake rivers, and to Johns Pond both via its natural outlet, the Childs River, and a manmade connection to the Quashnet River. (See Map 4-25.) These herring runs once provided a major staple of the Wampanoag's diet and the spring runs are still eagerly awaited by native and newcomer alike.

The rivers themselves have been greatly famous fisheries. The Mashpee River trout fishery was for almost a century "owned" by a group of wealthy Bostonians who leased the fishery from the Town and maintained a local warden to keep away poachers. One would need the permission of their Mashpee River Trout Club to enjoy the pleasures of the river's famous sea-run or "salter" trout. Those fish were native brook trout which grew to enormous proportions by adapting the habit of migrating down to Popponesset Bay to gorge on its plentiful food supply. Later, brown trout were stocked in the river and adopted the same sea-run habits. Much larger fish, they out-competed the brook trout to become the dominant species until the state stopped stocking them in

# Fish Runs

# Map 4-25



the 1990s. They are no longer found in the river, and brook trout are again abundant.

The Trout Club's members, chief among them John Farley, also purchased extensive tracts of land along the river to protect the fishery. That fortuitous circumstance, along with Farley's donation of much of his Mashpee River land to The Trustees of Reservations, accounts for the existence of an almost completely undeveloped river corridor whose preservation (now almost complete) has been one of the Town's major open space goals for the last three decades.

Farley also maintained a fishing camp on the west bank of the river just south of Route 28. Nearby, he developed Trout Pond, fed by icy springs east of the Pine Tree Corners rotary, as a trout hatchery and, in the early 1930s, engaged a young Cornell graduate student named William Dunlap Sargent to produce a biological survey of the river. Sargent's 1933 work provides a fascinating look at the flora and fauna of the Mashpee and is an invaluable reference for modern-day naturalists. The following is the listing of fishes he found in the river during the summer of 1931:

### *Mashpee River Fishes - 1931*

Sea lamprey ( <i>Petromyzon marinus</i> )	Glut (blueback) herring ( <i>Pomolobus aestivalis</i> )
Brook trout ( <i>Salvelinus fontinalis</i> )	American eel ( <i>Anguilla rostrata</i> )
Common sucker ( <i>Catostomus commersonii</i> )	Common bullhead ( <i>Ameiurus nebulosus</i> )
Great northern pike ( <i>Esox lucius</i> )	Broad killifish ( <i>Cyprinodon variegatus</i> )
Marine killifish ( <i>Fundulus heteroclitus</i> )	Fresh-water killifish ( <i>Fundulus diaphanus</i> )
Ten-spined stickleback ( <i>Pungitius pungitius</i> )	Common stickleback ( <i>Gasterosteus aculeatus</i> )
Two-spined stickleback ( <i>Gladiunculus bispinosus</i> )	Four-spined stickleback ( <i>Apeltes quadracus</i> )
Sea-shore silverside ( <i>Menidia beryllina</i> )	Bluefish ( <i>Pomatomus saltatrix</i> )
Common sun-fish ( <i>Eupomotis gibbosus</i> )	Johnny darter ( <i>Boleosoma nigrum olmstedii</i> )
Yellow perch ( <i>Perca flavescens</i> )	White perch ( <i>Morone americana</i> )

Glaringly absent at that time was the brown trout, which had not yet been stocked in the river. Sargent noted that he had come too late in the year to find the alewife (*Alosa pseudoharengus*) which he knew ran upstream in the spring. Also absent from his list was the American brook lamprey (*Lampetra appendix*), now listed by the state as a "threatened" species known to inhabit, in Massachusetts, only the Mashpee and Blackstone Rivers as well as some streams on Martha's Vineyard.

The Quashnet River was equally famous for its "salter" trout, being a well-known haunt of Daniel Webster until a mill dam, and destruction of its cedar swamps to create cranberry bogs, virtually eliminated the trout fishery. By the turn of the century it was acclaimed instead as the "longest cranberry bog in the world."

Today it is famous again as the subject of a concerted restoration effort by the local chapter of Trout Unlimited, led by Falmouth plumber and sportsman Francis Smith. After the cranberry bogs on the lower half of the river were abandoned during the 1950s, willows and other water-loving plants choked the river's channel, causing it to overflow its banks and turn the bogs into a warm-water morass totally unsuited to the remnant brook trout population which remained in its waters. Inspired in 1975 by DFW fisheries biologist Joe Bergin, the Trout Unlimited volunteers

soon undertook to restore the river to its former glory. They manually cleared the willows out of more than a mile of the channel, stabilized its banks and constructed a series of flow-deflectors and other structures to flush a century of muck from the river's original gravel bottom. A dam that blocked fish passage was removed. Cedar and oak platforms called "hides" were constructed at the waterline along the river's edge to provide the trout protection from marauding herons and other predators. By the early 1980s, brook trout and brown trout were reestablished in impressive numbers, along with a cross-breed known as the "tiger" trout, and Fran Smith's dream had become nationally famous as an example of successful stream restoration. Since then, with the decision of the DFW to stop stocking brown trout in the mid 90s, they have disappeared from the river, and native sea run brook trout have been fully restored to their historic place in the river. In addition, during 1997 sampling done for Mass. Military Reservation contamination the Town's Johns Pond Park cranberry bogs, a healthy population of spawning brook trout was discovered enjoying the cold springs which formed the original source of the river. According to current DFW fisheries biologist Steven Hurley, that population, along with most of Mashpee's fresh water fishery, continues to thrive.

Although it is a smaller and less-famous stream, the Santuit River is also notable for its trout. It maintained one of the last Cape Cod stocks of native brook trout not wiped out by, or interbred with, the European brown trout stocked in other streams. This population provided the basis for efforts to restock other streams with the native fish and is, according to Mr. Hurley, also doing well.

There are no brook trout in the Childs River. However, according to Mr. Hurley, records from the 1950s indicate that brook trout spawned in Red Brook and Quaker Run. In both cases, flooding of former cranberry bogs upstream appears to have increased water temperatures during the spawning season to a level above that tolerated by trout and they are no longer present. The flooding of the former cranberry bogs on the Santuit Pond Preserve has raised fears that similar damage may be done to the Santuit River trout fishery if the damage is not soon repaired.

Mashpee's rivers flow to two separate estuarine systems. The Mashpee and Santuit, along with Quaker Run, flow to the Popponesset Bay estuary. The Quashnet and Childs Rivers, along with Red Brook, Abigail's Brook and Dutchman's Creek, flow to the Waquoit Bay estuarine system.

Despite a general decline in their health, Waquoit and Popponesset Bays continue to be important spawning and nursery waters for a variety of truly estuarine species of fish, which spend their entire lives in our bays and coastal ponds (see the estuarine species listing below). Several exclusively marine species also use the estuaries seasonally or as a nursery area, while spending much of their adult life at sea. Anadromous and catadromous species are common users and visitors in season and many other species, which have no apparent estuarine requirements, are adventitious or irregular visitors.

Anadromous species sometimes present include the sea-run trout, blueback herring and alewife. Catadromous species include the American eel, which arrives in the Spring to mature within the estuaries, and the American Brook Lamprey, which travels up the Mashpee River via Popponesset Bay.

Species most able to tolerate the wide range of estuary water temperatures, which influence growth, reproduction and distribution, are most abundant. Other factors within these estuaries, such as salinity, acidity and dissolved oxygen, also limit the abundance and distribution of finfish. Fewer species can tolerate the wide range of salinity and acidity (ph) or the reduced dissolved oxygen found in an estuary, in contrast to conditions within the open ocean.

Although there is no significant commercial finfish industry within the bays, recreational fishing is growing. Smelt, herring, bass and perch have been taken within the estuaries. Flounder, alewife and herring have been valued harvests in abundant years. Bluefish, scup and menhaden have been harvested. Minnows, shiners, chub and grass shrimp are typical "baitfish" inhabitants. Schools of squid are also occasional visitors.

There is one endangered species listed for Waquoit Bay, the shortnose sturgeon, which was last verified in the bay in 1871.

In the 1960's, the State Department of Marine Fisheries conducted several estuarine surveys, including a study of the marine resources of the Waquoit Bay - Eel Pond estuary. The following species list is adapted from the DMF's report:

### ***Waquoit Bay Finfish Species***

Common Name	Scientific Name
<u>Species which spend their entire lives in the estuaries</u>	
Atlantic Silverside	<i>Menidia menidia</i>
Ninespine Stickleback	<i>Pungitius pungitius</i>
Blackspotted Stickleback	<i>Gasterosteus wheatlandi</i>
Northern Pipefish	<i>Syngnathus fuscus</i>
Oyster Toadfish	<i>Opsanus tau</i>
Sheepshead Minnow	<i>Cyprinodon variegatus</i>
Tidewater Silverside	<i>Menidia Beryllina</i>
Mummichog	<i>Fundulus heteroclitus</i>
Rainwater Killifish	<i>Locania parva</i>
Threespine Stickleback	<i>Gasterosteus aculeatus</i>
Fourspine Stickleback	<i>Apeltes guardracus</i>
<u>Anadromous and catadromous fish species</u>	
Alewife	<i>Alosa pseudoharengus</i>
Blueback Herring	<i>Alosa aestivalis</i>
Brook Trout	<i>Salvelinus fontinalis</i>
Brown Trout	<i>Salmo trutta</i>
Rainbow Smelt	<i>Osmerus mordax</i>
Striped Bass	<i>Morone saxatilis</i>
White Perch	<i>Morone americana</i>
American Eel	<i>Anguilla rostrata</i>

Marine species which visit the estuaries seasonally

Atlantic Needlefish	<i>Strongylura marina</i>
Northern Kingfish	<i>Menticirrhus saxatilis</i>
Scup	<i>Stenotomus chrysops</i>
Northern Seabrook	<i>Prionotus carolinus</i>
Striped Seabrook	<i>Prionotus evolans</i>
Grubby	<i>Myoxocephalus aeneus</i>
Longhorn Sculpin	<i>Myoxocephalus octodecemspinosus</i>
American Sand Lance	<i>Ammodytes americanus</i>
Striped Mullet	<i>Mugil cephalus</i>
Northern Puffer	<i>Sphaeroides maculatus</i>
Summer Flounder	<i>Paralichthys dentatus</i>

Marine species which use the estuary as a nursery ground and often return seasonally

Atlantic Menhaden	<i>Brevoortia tyrannus</i>
Atlantic Tomcod	<i>Microgadus tomcod</i>
White Hake	<i>Vrophycis tenuis</i>
Tautog	<i>Tautoga onitis</i>
Cunner	<i>Tautoglabrus adspersus</i>
Winter Flounder	<i>Pseudopleuronectes americanus</i>

Irregular visitors with no apparent estuarine requirements

Atlantic Cod	<i>Godus morhua</i>
Pollock	<i>Pollachius virens</i>
Black Seabass	<i>Centropristis striata</i>
Bluefish	<i>Pomatomus saltatrix</i>
Lumpfish	<i>Cycloperus lumpus</i>
Rock Gunnel	<i>Pholis gunnellus</i>

Freshwater fishes that occasionally enter brackish waters

Banded Killifish	<i>Fundulus diaphanus</i>
White Sucker	<i>Catostomus commersoni</i>
Golden Shiner	<i>Notemigonus crysoleucas</i>
Johnny Darter	<i>Etheostoma nigrum</i>

Outside the estuaries, there is an active commercial and recreational fishery on Vineyard and Nantucket Sounds and beyond. Surf fishing is popular wherever public access allows, particularly at South Cape Beach (both the Town and state beaches) and Popponesset Beach (accessed via a state fisherman's access at the end of Wading Place Road and at the privately-owned Sandy Beach on Shore Drive during the winter). Although it involves a long walk, the Waquoit Bay jetty at the end of Dead Neck in South Cape Beach State Park is a very popular fishing spot. Striped bass and bluefish are the most popular objects of the surf fisherman's efforts.

Although there are no commercial charter boats operating out of Mashpee, deep sea fishing from private boats is a favorite Mashpee recreation. Popular game fish are striped bass, bluefish, bluefin tuna, mackerel, pollock and bonito. Bottom fish are also avidly sought, including sea bass, tautog, scup, halibut, ocean perch, cod, flounder and haddock.

## **2. Shellfish**

Shallow, warm waters, with a sand to sand-mud sediment and the availability of sea grasses (the latter now greatly diminished in both estuaries) provide a desirable habitat for an abundance and broad distribution of shellfish.

Quahogs and soft shell clams are of principal importance and are harvested for commercial and recreational purposes. Soft shell clams inhabit sandy, intertidal areas. Quahogs, or hard shell clams, are found in sandy and sandy-mud sediments of the lower intertidal and subtidal areas. By 2006, Quahogs continued to be abundant, but the wild soft-shell clam population had declined to very low numbers for undetermined reasons, which may include diseases or predation, possibly by the increasing numbers of blue crabs observed in the bays.

Bay scallops were formerly harvested in large numbers but have become rare since the late 1980s as eel grass disappeared. The Shellfish Department has re-established a scallop harvest in recent years through the release of 1,000,000 large seed (in 2006) grown in its artificial propagation program (along with 1,000,000 quahog seed). About 40 bushels of scallops were harvested in Waquoit Bay from October to December of 2006, but the scallop population no longer sustains itself in the wild and is dependent on annual seeding.

Oysters had disappeared from Mashpee waters by the early 1980s. However, in 2004 the Department also began a “remote set” oyster propagation program, using oyster spat set on pieces of shell in the ARC hatchery and Dennis, which were then transported in 200 spat bags to low salinity waters in the Mashpee River. About 160,000 oysters grew from that spat. The program was increased to 380 bags in 2005 and 400 in 2006. In addition, 1,000,000 additional very small oysters were purchased from the hatchery in 2006, of which approximately 500,000 had grown larger than 2 inches by fall of 2006 in trays in the Mashpee River. 2006 saw the first significant Mashpee oyster harvest in decades, with approximately 100,000 oysters harvested. This number increased to approximately 150,000 in 2007.

Other shellfish species, such as mussels, conch and spider and blue crabs are also present in both bays.

Shellfish are filter feeders, entrapping minute planktonic plants and animals from sea water. They may also consume and accumulate biological contaminants in their tissue. While a lack of industrial uses of the bays all but precludes the chance of heavy metal contamination in large amounts (although it is present in road runoff and as a result of boat engine exhaust and marina operations), near-shore development and other uses of these estuaries bring a substantial risk of bacterial and limited chemical contamination to the shellfish population. The State Division of Marine Fisheries, with the assistance of the Mashpee Shellfish Department, has established a regular schedule of testing for bacterial contamination in waters overlying shellfish areas. In

addition, a program of sanitary shoreline surveys (aided by a grant from the U.S. Food & Drug Administration) is directed at possible contributing sources of contaminants.

There is currently one designated shellfish grant area in Waquoit Bay and three designated areas in Popponesset Bay. These grant areas, leased by the Town to shellfishermen, entitle holders to cultivate shellfish in bottom sediments, but confer no rights to the water column above. From time to time additional requests for grant area use, or inquiries about shellfish propagation in areas outside of designated grant areas, have occurred, and will occur. Expanded aquaculture and mariculture uses are to be anticipated, and may require the designation of reserve areas, free of disruption, traffic and contamination. Great Flat Pond appears to offer ideal conditions for a revival of oyster culture, having just the right level of salinity to support oysters but not their most common enemies.

Shellfish bed closures have occurred at Shoestring Bay and the lower Mashpee River due to elevated bacterial counts. These closures have been of great concern to the Town, since they have reduced the area of shellfish beds available to support a growing population of recreational shellfishermen. Roadway drainage improvements have been made over the last 20 years to reduce bacterial flows from public ways, and additional projects are proposed, but elevated counts have persisted.

Prime habitat remains in portions of Mashpee's estuaries for quahogs and soft shell clams, though reduced. As natural and human activities occur, such as storms, dredging or dock construction, suitable habitat is continually altered.

Other than the few species popular with shellfishermen, there are a wide variety of shellfish and other marine invertebrates present in our estuaries. The species list below identifies most of those which have been identified:

Mashpee's fresh water ponds also host a variety of clams, mussels and mucketts. The three most notable are the eastern pond mussel (*Ligumia nasuta*), the tidewater mucket (*Leptodea ochracea*), and the Triangle Floater (*Alasmidonta undulate*), all of which are listed as Species of Special Concern by the Natural Heritage and Endangered Species Program. They prefer quiet waters with sandy bottoms. Their larvae are both parasitic on certain species of fish, to whose gills they attach themselves until they reach the juvenile stage, when they drop to the bottom of the pond. As a result, their existence is dependent on the continued existence of their host fish which, in the case of the mucket, may be the anadromous alewife. Acid rain damages both these shellfish and their host fish. Other pollutants as well as habitat destruction also threaten their continued presence in our ponds.

## *Shellfish and Other Marine Invertebrates*

<u>Common Name</u>	<u>Scientific Name</u>
<u>Molluscs</u>	
Slipper Shell	<i>Crepidula fornicata</i>
Slipper Limpet	<i>Crepidula plana</i>
Common Periwinkle	<i>Littorina littorea</i>
Moon Snail	<i>Lunatia heros</i>
Soft Shelled Clam	<i>Mya arenaria</i>
Quahog	<i>Mercenaria mercenaria</i>
Ribbed Mussel	<i>Modiolus demissus</i>
Jingle Shell	<i>Anmia simplex</i>
Blood Ark	<i>Andara osalis</i>
Common Mussel	<i>Mytilus edulis</i>
Bay Scallop	<i>Aequipecten irradians</i>
Razor Clam	<i>Ensis directus</i>
Moon Snails	<i>Polinices duplicatus</i>
Knobbed Whelk	<i>Busycon carica</i>
Channeled Whelk	<i>Busycon canalialatum</i>
Sea Clam	<i>Macra solidissima</i>
American oyster	<i>Crassostrea virginica</i>
Lunar dove-shell	<i>Mitrella lunata</i>
Thick-lipped drill	<i>Eupleura candata</i>
Oyster drill	<i>Urosalpinx cinerea</i>
Eastern Mud Snail	<i>Nassarius obsoletus</i>
Stimpson's surf clam	<i>Spisula polynyma</i>
Atlantic surf clam	<i>Spisula solidissima</i>
Morton's egg cockle	<i>Laevicardium mortoni</i>
False angel wing	<i>Petricola pholadiformis</i>
Gem Clam	<i>Gemma gemma</i>

### Arthropods

Barnacle	<i>Balanus sp.</i>
Blue crab	<i>Callinectes sapidus</i>
Mole crab	<i>Emerita talpoida</i>
Horseshoe crab	<i>Limulus polyphemus</i>
Spider crab	<i>Limulus polyphemus</i>
Green crab	<i>Carcinus maenas</i>
Hermit crab	<i>Pagurus longicarpus</i>

### Decapods

Squid	<i>Loligo paelci</i>
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### 3. Mammals

While Mashpee's most abundant mammals may now be ourselves and our pets, the town still maintains healthy populations of many native species. The largest and most sought-after game animal is the white-tailed deer (*Odocoileus virginianus*). While there has been a significant decline in appropriate habitat in Mashpee, they are very adaptable and can still be found throughout the region. Prime habitat is a mixture of immature woods and brushy areas interspersed with open fields and meadows. While Mashpee's habitat mixture pre-1950 was probably a paradise for deer, there are still significant areas of such habitat in the town. More importantly, significant areas of unfragmented forest habitat remain due to open space land acquisition projects by the Town, the Commonwealth and the U.S. Fish & Wildlife Service. Such large areas are critical both to provide a protective separation between the deer and us, and more particularly our dogs, and to provide sufficient food resources to sustain a breeding population.

Deer are browsers and eat an enormous variety and amount of vegetation. Each day a 200-pound deer needs ten pounds of food to stay healthy. In the summer and fall they feast on foliage, twigs and berries. In the fall our abundant acorns, as well as mushrooms and beechnuts, are delicacies. Winter food sources are most critical. In winter, deer will feed on evergreen needles, pine sprouts, dry grasses and leaves.

Although some deer are known to wander quite a ways on Cape Cod, the area in which they normally travel, their "home range" is usually no more than a mile across. During the winter, a typical group of a couple of bucks and four or five does with their fawns will inhabit an area of about 300 acres. In some cases, deer have been known to remain for their entire life in a particular well-protected cedar swamp. Ideal deer habitat of adequate size to support healthy populations can be found in the South Mashpee pine barrens / cedar swamp area, the Jehu Pond area's forests, abandoned bogs, salt marsh and cedar swamps, South Cape Beach State Park, the 1300 acres of protected land south of Route 151 along the Quashnet and Childs Rivers, the Noisy Hole / upper Mashpee River area, the Santuit Pond Preserve, the combination of Lowell Holly Reservation and Sandwich's adjacent Ryder Conservation Area and the large area of young forest preserved by the Town, Commonwealth and Orenda Wildlife Land Trust adjacent to the Massachusetts Military Reservation.

These areas are well known to Mashpee's hunters. Deer season is anticipated both by visiting hunters from other parts of the state and by natives. The white-tail deer was the main game species sought by the Wampanoag and the fall hunt is still an integral part of Mashpee Wampanoag traditions. For newcomers from more urban areas, the hunt comes less naturally and can be threatening. Some object to the concept itself. The Orenda Wildlife Trust's lands are closed to hunting. Others are concerned about their safety as residential homesites crowd into traditional hunting areas while more and more residents take to the woods for other forms of recreation. If hunting is to remain viable in Mashpee, our large areas of unfragmented forest must be maintained to provide for necessary safety margins, while hunters and other residents must be educated regarding safety and the courtesies necessary to maintain compatibility between competing uses of our forests.

Despite the fact that there are plenty of them out there, most Mashpee residents rarely, if ever, see a deer. Making such a sighting is always an exciting experience. Winter and spring, when deer may invade domestic landscapes in search of food which has become scarce in the forest, may be the most likely seasons for such encounters. Dawn and dusk, when deer's browsing activity peaks, are the best times to see them. Even then, finding them will be rare, as their excellent sense of smell and general wariness will send them off into the woods before we realize it. For those who seek contact with the deer, finding signs of their presence - hoof prints in the mud, a pile of scat, chewed twigs or even an old antler - is much more likely and can be almost as satisfying.

Some of our other mammalian neighbors are much more easily seen and enjoyed. The red squirrel (*Tamiasciurus hudsonicus*), grey squirrel (*Sciurus carolinensis pennsylvanicus*) and eastern chipmunk (*Tamias striatus*) can all be found in most back yards, as well as throughout our forests, due to the predominant mix of oaks and pines. All three are most active during daylight hours, further assisting observation.

The red squirrel prefers to dine on the seeds of pines and cedars, though they will eat almost any kind of nut, seeds, berries, buds, tender leaves and the inner bark and flowering parts of many kinds of trees. They also eat grasses, mushrooms, insects, snails, birds and their eggs and may even kill young rabbits and grey squirrels. Unlike grey squirrels, which store their food at random, they bury theirs in large underground caches containing a bushel or more. Mainly a tree dweller, the red squirrel favors evergreen forests and will establish its nest among branches against a tree trunk, in tree cavities, old crows' and hawks' nests or sometimes in stone walls or burrows. It will also aggressively defend its food cache during the winter as well as a specific home territory year-round.

The grey squirrel is a much friendlier and less pugnacious creature. Although it is alert, nervous and wily, it can sometimes be coaxed into taking food from your hand. Most active at dawn and in the late afternoon, they are also tree dwellers but come to the ground to feed. Their favorite habitat is a hardwood, or hardwood / softwood forest where there are nut-producing oaks and beeches. Aside from acorns and other nuts, they eat buds, the inner bark of trees, cherries, grapes, apples, mushrooms and corn. Sometimes they eat insects, young birds and eggs and can be found gnawing on antlers, bones and turtle shells. We have all seen the large, round leaf nests they weave in the upper branches of our trees. These are lined inside with shredded bark, moss, grass, ferns, paper, cloth and other soft materials but are actually only temporary shelters. Their permanent homes are almost always in tree cavities.

Unlike the two squirrels, the chipmunk rarely climbs trees. It makes its den in a burrow, which will usually have the entrance hidden under an old log, stump, rock or stone wall, and to which it retreats in the winter for about four months of light hibernation. The chipmunk favors the borders of hardwood forests where thick understory and briars grow among old logs or stone walls, although it can also be found in old forests without undergrowth, in brushland, old buildings, parks and (sometimes disastrously) gardens. Nuts and a wide variety of seeds are its favorite food, often stuffed into its remarkable cheek pouches. Chipmunks have been recorded as carrying as many as 31 corn kernels and up to 70 sunflower seeds in those cheeks!

Mashpee also hosts other rodents of various sorts. The White-footed mouse (*Peromyscus leucopus*) prefers to nest in trees above ground level near the edge of pine and oak woods. The seldom-seen but very numerous meadow vole (*Microtus pennsylvanicus*) lives in extensive, complex underground tunnels and pathways in dense grass and other growth. The pine vole (*Microtus pinetorum scalopsoides*) is a real digger, seldom leaving the protection of the burrows it makes in loose, well drained soil 3 to 4 inches below the surface.

The largest of our rodents is the muskrat (*Ondatra zibethicus*). It builds a house of reeds or cattails, or burrows a den into the mud banks of our streams, ponds or old cranberry bog ditches. Entrances to bank dens are located underwater and slope up into a dry chamber which contains a nest of dried vegetation. Houses made of water plants are usually located in about two feet of water and may be up to four feet high and ten feet in diameter. They are often accompanied by smaller feeding or shelter huts surrounding the main house where the muskrat can bring food to eat without interference from predators or weather. Food consists mainly of aquatic plants, but may include almost any succulent, tender growth. Muskrats will also eat insects, freshwater clams, crayfish, snails, mussels, frogs, reptiles, turtles, minnows, young birds and carrion. Because they are primarily nocturnal, they're rarely seen by casual observers.

Much more visible, to the dismay of many local gardeners, is the woodchuck (*Marmota monax*). It hibernates for six months of the year. Unfortunately, the six months that it is awake coincide with our gardening season, during which it partakes voraciously of a wide variety of succulent plants to store body fat for the winter. It prefers the edges of brushy woodlands, fields or stream banks and was recorded as being plentiful along the Mashpee River during Sargent's 1931 survey. Woodchucks live in large burrows, up to 40 feet long, which may go down six feet or more.

Another garden raider, although one with a less unfavorable reputation, is the eastern cottontail (*Sylvilagus floridanus*). Although not native to New England, eastern cottontails have adapted well to the lawns and shrubbery of New Seabury in addition to more natural habitats and so are often seen by delighted children, adults, cats and dogs. Aside from our lawns and gardens, they prefer meadows, dense high grass, wood thickets, forest edges and the edges of sedge swamps and marshes. The similar, but rare, native New England Cottontail (*Sylvilagus transitionalis*) prefers dense, bushy woodlands and pine forests but have also been found in a variety of other habitats from salt marsh to oak forest. Although neither species digs burrows, they take advantage of abandoned woodchuck burrows, rock crevices and hollow logs. Mostly nocturnal, they spend most of the day resting in "forms" scratched into the ground in dense grass, weed patches, fields, scrubby woods and thickets. Cottontails eat almost any kind of green vegetation, including bark, twigs and buds of woody plants, as well as the nearest lettuce patch.

Even more familiar, and usually less welcome, in our back yards is the ubiquitous striped skunk (*Mephitis mephitis nigra*). A member of the weasel family, it lives in a wide variety of habitats, from the sands of South Cape Beach to our densest forests, although brushy woods are among its favorite haunts. The skunk may dig its own burrow but prefers to use natural cavities or abandoned burrows of woodchucks, red foxes, muskrats and other mammals. It is primarily a night animal, but is also active at dawn and dusk. Its diet includes a great variety of insects, earthworms, snails, grains, nuts, corn, grasses, leaves, buds, apples, berries, bird eggs, frogs,

snakes, turtles and their eggs, mice, voles, moles, shrews, rats, chipmunks, bats, squirrels, rabbits, garbage and carrion. The variety in its diet may be matched only by our own, which among Mashpee's Wampanoag community, includes the skunk itself. Even today, there are those who have mastered the art of catching skunks without suffering the consequences, and the culinary result of their efforts has sometimes been an eagerly-sought treat at the tribe's annual Fourth of July Pow Wow.

Another member of the weasel family hunted by locals is the mink (*Mustela vison*). Famous for its luxurious fur, it lives along rivers and streams, lakes and marshes, preferring forested, log-strewn areas. The mink may dig its own den along or near the banks of a water body, or under a log or stump, or it may take over one from another animal, such as a muskrat house. Mostly nocturnal, it also hunts at dusk and dawn for fish, frogs, crayfish, clams, turtles, snakes, lizards, earthworms, insects, mice, rats, bats, muskrats, moles, rabbits and birds.

In the last few decades, the river otter (*Lutra canadensis*) has returned to Mashpee's waters. Even in Sargent's day it was rare, having been severely impacted by hunting for its beautiful fur. Tom Mingo, John Farley's trout warden, was in the habit of trapping them occasionally along the Mashpee River, as the otter is a fish eater. Between then and now there were only rare reports of otter sign. During recent years, however, definitive sightings have been made and otter slides have been found along the Mashpee. The facts that they are primarily nocturnal and frequently use abandoned muskrat houses or woodchuck burrows, a naturally sheltered spot beneath large roots, fallen trees, hollow logs or thickets near water for shelter rather than creating their own den, make finding them difficult, even when there are many. Excellent swimmers, otters eat fish, crayfish, frogs, clams, salamanders, snails, turtles, earthworms, small snakes, birds and some plants.

While sightings of river otters remain rare, another mammal species has moved into the area rapidly, visibly and definitively. The eastern coyote (*Canis latrans var.*) is a variety of the coyotes found out west that picked up some Canadian wolf genes as its range extended eastward with the extermination of our native wolves. First seen on our side of the canal only in the 1980s, it is now a resident of every town on Cape Cod. Dens have been found even within New Seabury, where small dogs and cats might occasionally provide easy prey. On the other hand, even though large males may reach 50 pounds, larger domestic dogs are among their chief, and only, predators. Coyotes may also interbreed with domestic dogs, with "coydog" being the common name applied to the offspring. Coyotes, like most canines, are social animals and may hunt together in pairs or in groups of three or more, primarily between dusk and dawn. They eat birds, snakes, frogs, lizards, turtles, fish, crayfish and insects, as well as fruits, berries and other plants. Their primary food, however, is believed to be deer carrion, although they also prey on fawns. Unfortunately, domestic pets such as cats and small dogs have also become frequent prey, and a number of attacks on humans have made the headlines in recent years.

Another relatively new resident, albeit much less spectacular, is the Virginia opossum (*Didelphis virginiana*). Gradually moving north over the decades from its southern homeland (it was not found anywhere in New England before 1900), it is now firmly established among our local fauna. Known for its marsupial-like pouch and occasional habit of "playing possum" when threatened, this strange looking nocturnal creature with the beady eyes and rat-like tail is most

often seen in the glare of automobile headlights as it crosses the road, appearing somewhat ghost-like with its pale gray fur. Seldom staying in the same place two nights in a row except in winter, it does not develop its own den but rather uses the abandoned dens and burrows of other animals, tree cavities, hollow logs, brush, wood, trash piles, spaces beneath buildings and drainpipes for shelter.

Two other large mammals deserve mention, as they are among our favorites. In sharp contrast to the rather dim-witted and strange-looking opossum, the red fox (*Vulpes vulpes*) and the raccoon (*Procyon lotor*) are famed for their cunning and good looks. Spotting either is always a highlight for Mashpee residents (except, of course, when the raccoon has just ripped open half a dozen garbage bags!).

The red fox was our preeminent mammalian predator until the arrival of its larger relative the coyote. It will eat almost any available food, including carrion, small mammals, birds, eggs, insects, worms, turtles and their eggs, frogs and snakes, wild berries, grapes, plums, apples, nuts, corn and other grains, even rope, twine, paper, sticks and trash! It normally buries surplus food or covers it with grass or leaves, sprinkling it with urine. Chiefly a night hunter, it may be seen at dawn or dusk. Its den, usually enlarged from a woodchuck or other mammal's den, extends at least four feet underground and from 25 to 75 feet long, but is used mainly for pups or temporary refuge. The adult fox itself sleeps outside, even in sub-zero weather, protected by that beautiful red coat.

The raccoon generally prefers fairly open mature hardwood forests near streams, rivers, ponds and lakes. Mashpee's aging forest is likely to provide it with more and more of such favored habitat, as long as it is not chopped down first. While its numbers have been greatly reduced due to land development, it is very flexible creature and more common than one might suspect, given its nocturnal habits. It usually nests in hollow trees but will use hollow logs, stump cavities, rock crevices, deserted buildings, barn lofts, brush piles, drains, culverts, abandoned muskrat houses, fox dens and woodchuck burrows. It dens during the winter but does not hibernate, although it does not feed and will lose about half its body weight before it resumes feeding in the spring. When it does eat, it will eat just about any kind of animal or plant food. Although coyotes and great horned owls will occasionally capture a cub, man and dogs are its chief enemies. As a result, the best thing we can do for the raccoon, as with many of our other mammals, is to preserve as many large unfragmented forest areas as possible.

Mashpee hosts no endangered, threatened or watch-list mammals.

#### **4. Reptiles and Amphibians**

Reptiles are air-breathing, cold-blooded, terrestrial vertebrates, covered with bony scales or plates, or both. Mashpee's reptiles include a variety of snakes and turtles. There are no lizards, the other reptilian type, in this part of New England.

Turtles are generally more abundant than snakes. The most common species found in Mashpee are the snapping turtle (*Chelydra serpentina*), feared by timid swimmers who value their toes, and the much friendlier, brightly colored painted turtle (*Chrysemis picta*). Both are aquatic

turtles. Often found in association with the painted turtle, but now much rarer, is the spotted turtle (*Clemmys guttata*), a pond turtle listed by the state as a species of special concern. Another species so listed is the land-dwelling eastern box turtle (*Terrapene carolina carolina*). Rarest of all our turtles is the northern diamondback terrapin (*Maclemys terrapin terrapin*), which favors salt marshes.

The snapping turtle can become quite large, reaching a total length of 25 inches or more, with a record shell length of 18 inches. Described as a turtle with a long tail and a short temper, the snapper is a very active creature who defends itself very efficiently by biting savagely at intruders. It is a voracious eater and, although otherwise fairly clumsy, can strike with the head very quickly. This trait is used to great effect on fish lulled into carelessness while the snapper waits in ambush, although recent studies have shown that its diet is composed largely of water plants. Fortunately for swimmers, the snapper is usually inoffensive when stepped on in the water and saves its vicious defensive tactics for its forays onto dry ground, where the female lays its eggs in sand nests in the spring. Those eggs hatch in September, at which time the little snappers waddle off to the nearest water body as fast as they can go. Although the adult turtles have no natural enemies, foxes and minks will take many of the eggs and hatchlings, as will local fishermen, who occasionally destroy nests in order to protect favored fisheries.

The painted turtle has an adult shell length of 4½ to 6 inches. The shell (“carapace”) is smooth and black with red or yellow markings around the margins of the plates, and the underside (or “plastron”) is yellow. Its head is black with yellow spots, while its black legs are marked with red. The painted turtle can often be seen sunning itself on logs or rocks near the water’s edge, but will dive quickly at the first sign of danger. Its diet is quite varied, including just about any kind of available plant and animal, fresh or rotten. In June the female excavates a nest on dry land near water and lays eggs which will hatch in early fall. Trout Pond near the Mashpee River is a favorite haunt of the painted turtle, along with other small fresh water ponds, although it can occasionally be seen in our rivers as well.

The spotted turtle is another small black turtle (3-5 inches long), but with small, round yellow spots on its back. The plastron is yellow with black blotching and the head black with yellow, or sometimes orange, markings. Although, like the painted turtle, it is a pond and wetland dweller, it will wander much farther from the water. This appears to have put it at relatively greater danger from man, with many run over by cars or captured for the pet trade, where they regularly command prices as high as \$400 in Europe and Japan. Alteration of wetlands and destruction of upland habitats for residential and commercial development are also key factors in the population decline of this once-common species now become rare and listed as a Species of Special Concern by the state’s Natural Heritage and Endangered Species Program.

Another Species of Special Concern is the eastern box turtle, a land dweller most at home in our pine barrens and oak thickets, where it is generally associated with cranberry-dominated swales interspersed with bearberry ground cover, low bush blueberries and thickets of bracken fern. Ranging from 4½ to 8 inches in length, it has a high-domed yellowish shell which provides a fluid reservoir that acts as a buffer against the temperature changes which accompany a terrestrial existence and supplies the turtle with water. Few animals are more completely armored against attack than is the box turtle. With its lower shell hinged so that when the head and feet are

withdrawn the shell can be completely closed, the box turtle is safe from all of its enemies except man and fire. Unfortunately, its terrestrial habits put the box turtle in direct competition with man for prime real estate, with the turtle increasingly the loser. With a typical adult having a home range averaging 100 to 750 feet in diameter, the fragmentation of its habitat by roads and other development reduces or destroys populations. Its continued existence depends on our preservation of large roadless areas of its optimal habitat.

The northern diamondback terrapin is at the northernmost limit of its natural range here on Cape Cod. Once commonly found in coastal marshes, tidal flats, coves and estuaries from Cape Cod to Cape Hatteras, its value as a gourmet food item brought it close to extinction during the first half of the twentieth century. Its population has now stabilized southward from Long Island Sound but it continues to be rare here, being listed as threatened in the state. It is dependent on high sand dunes for nesting, which occurs in May and August, making its existence highly fragile as our very limited dune areas are developed for residential or increased recreational use.

Mashpee's other reptiles, the snakes, number five species. The ringneck snake (*Diadophis punctatus*), black snake or black racer (*Coluber constrictor*), milk snake (*Lampropeltis triangulum*), water snake (*Natrix sipedon*) and garter snake (*Thamnophis sirtalis*) are common in most of southern New England and none is listed as rare in the state.

The ringneck snake is a beautiful little snake of the woodlands, 10-15 inches long with blue-black above, orange below and with a yellow ring around the neck. It is a burrowing snake, which often hides under stones, bark or rotting logs. In the past, uncontrolled forest fires often destroyed these places of refuge, but with current fire suppression practices it is probably increasing in number where the forest has not been cleared for development.

The black racer is our largest snake, with adults ranging between 36 and 60 inches in length, producing quite an effect on hikers who happen to encounter it in the wild. As its name implies, it is solid black and is an alert, fast-moving snake which feeds on any animal it can capture and swallow, including small mammals, birds and frogs. While it is a terrestrial species, it can often be found in wet meadows and cranberry bogs, where it is fond of hunting frogs.

The milk snake is a medium-sized (24-36 inch) brightly colored ground snake. Its body color is grey, marked with many brown or russet-red blotches which are edged with black. The milk snake normally hunts for small mammals such as mice and voles and may be seen around barns and other places where mice thrive, but otherwise stays hidden from view.

The water snake, sometimes mistakenly referred to as a "water moccasin" (the real water moccasin is a poisonous snake common in the south which has never been found in Massachusetts), is common around swamps, marshes, ponds and rivers. It is a thick snake, with adults being a dingy brown in color with red markings on the belly, while the young are usually cross-banded and frequently reddish-colored. It has an ugly disposition when cornered, biting and discharging a foul-smelling musk, and is a voracious eater of fish, frogs, shrews, birds and the like. It was once thought to be destructive to fish populations, but when other food is in abundance it actually takes few healthy large fish, probably actually improving fish populations by culling out sick and less vigorous individuals.

Our most familiar and abundant snake is the little garter snake (usually less than 30 inches in length), which is often seen in our gardens or back yards. It is extremely variable in color and pattern, being normally dark greenish to brown, with three yellowish stripes down the back and sides, although it is often seen with a checkered skin. Although it can swim quite well, it is a terrestrial species common in a wide variety of habitats.

Like the reptiles to which they are only distantly related, amphibians are cold-blooded. However, they are much more closely bound to the water, as most return to the water to breed. Most pass through an aquatic larval stage and all require a moist, cool environment in order to survive. All amphibians breathe a certain amount of oxygen directly through the skin and must keep it constantly moist or they will smother. It is for that reason that they are never found far from the water or from damp places. The eggs of amphibians are not protected by a hard shell and must, therefore, be laid in the water in which the larvae develop. Despite that dependence, they are among our most abundant vertebrates.

Mashpee's amphibians include three species of salamander, one toad and six frog species. Our salamanders are the red-backed salamander (*Plethodon cinereus*), the red-spotted newt (*Notophthalmus viridescens*) and the spotted salamander (*Abystoma maculatum*). Our toad is *Bufo americanus*, the American toad. The frogs are the irreplaceable spring peeper (*Hyla crucifer*), the bullfrog (*Rana catesbeiana*), the green frog (*Rana clamitans*), the leopard frog (*Rana pipiens*), the pickerel frog (*Rana palustris*) and the wood frog (*Rana sylvatica*).

The red-backed salamander is fairly abundant in Mashpee, although not as abundant as in other parts of southern New England where it is the most abundant terrestrial species. It can be found under virtually any fallen rotting log in our woodlands today, but may have suffered in the past from frequent forest fires which not only destroyed individuals but also the old logs in which they lived, as well as their breeding places. It has a slender dark brown body with a broad reddish stripe on its back and rarely exceeds 3½ inches in length. Unlike almost all other amphibians, it does not normally lay its eggs in the water, but rather in damp places, usually under rotting logs.

The red-spotted newt is an aquatic salamander found in some of our ponds, including Mashpee Pond. Adults are normally olive green on the back and yellow below, speckled all over with black and with a double row of red dots within black circles on the back. In its second or third year of life, the young newt will commonly leave the water and live for one to three years on land, during which time its skin changes to a brick red or orange all over the body. During that period, the newt is known as a "red eft". After its sojourn on the land, the newt returns to the water, which it never leaves again.

The spotted salamander may be our most popular amphibian, being the object of extensive habitat protection efforts, the subject of many school naturalist programs and fairly attractive as well. It is our largest salamander (6 to 7¾ inches), with a generally black body, slate-grey belly and yellow or orange spots arranged in an irregular row along each side of its back. It is normally found in moist, shady mixed or deciduous woodlands or meadows where there are nearby vernal pools, ponds, marshes or slow streams which are used for breeding during the early

spring. The spotted salamander spends most of its time underground, sometimes visible under logs or stones during wet weather. Its favored food items include insects, slugs, snails and earthworms. It hibernates underground during the winter, then migrates to its birth site upon stimulation from early spring rains to begin breeding. On Cape Cod, breeding is almost exclusively in vernal pools, which are temporary woodland ponds which are free of predatory fish, and occurs between early March and early April. As a result, protection of vernal pool habitat and the uplands around vernal pools where the salamanders spend most of their lives, as well as avoiding cutting those upland areas off from the vernal pool with roadways, are critical to ensure this attractive creature's survival in Mashpee.

Probably the most familiar amphibian to all of us is the common American toad, frequently found in our gardens, on our doorsteps or, unfortunately, in our basement window wells. Known for its dry skin and warts (which cannot be transmitted to humans, despite the old myths), the toad may vary in color from a dull brick red, through numerous shades of brown, to yellow. In April and May toads congregate in marshes and ponds to spawn, at which time they become persistent singers, with a high-pitched sound that is almost bird-like in its quality. The female lays as many as 20,000 eggs in long strings of jelly. These hatch in about four days and grow from tadpoles to their adult form in about a month. Toads eat earthworms and a great variety of insects, making them a welcome yard guest.

On Cape Cod, the surest sign of spring is the cricket-like song of the spring peeper. A tiny creature (1¼ inch in length), it is usually a fawn or brown color with a dark X on its back and a dark V-shaped mark between its eyes. The peeper is equipped with large adhesive discs on its toes that help it climb into trees and bushes. In early spring, thousands migrate from the trees to the edges of ponds and streams for breeding, at which time their chorus can be almost deafening. However, because of their arboreal and very shy habits, they are almost never seen during other seasons.

The mottled brown and green bullfrog is the largest (sometimes reaching 8 inches in length) and most aquatic of North American frogs. It is a voracious eater, and will consume anything which is alive and small enough for it to swallow, including mice, small turtles, rats, bats, smaller frogs, insects and fish. Its unmistakable foghorn-like call can carry for hundreds of feet on a still night and represents **the** sound of the wetlands to most people. Like our other frogs, the bullfrog lays its eggs in the water in the spring, although it is the last to emerge from hibernation.

The green frog is probably our most numerous, being very common in almost all wet places. It resembles a small bullfrog (2¼ to 3 ½ inches long) except that it has a ridge down each side of its back. Its color is greenish or brownish, with small dark spots on the back and sides. Its habits are quite similar to those of the bullfrog, although it is slightly more terrestrial and insectivorous.

The leopard frog is reputed to be the best jumper of our frogs, with one individual having jumped a record 44 inches. It is one of two local spotted frogs, having a 2 to 3½ inch brown, tan or green body with dark brown rounded spots with white borders arranged in two or three lengthwise rows. It is often found in moist meadows, sometimes quite far from water, although it is more common in shallow ponds. It is one of the early singers in the spring. In April and May the males sit half-submerged in the water and croak in chorus. The females lay their eggs at that

time and by the end of the summer the little leopard frogs leave the water and forage on the shore for a few weeks before returning to hibernate for the winter. The leopard frog is almost entirely insectivorous and is much more terrestrial than the bullfrog or green frog.

The pickerel frog is quite similar to the leopard frog in general appearance and markings, but the dark spots on its back are larger, more rectangular and lack the white edging. It also has bright orange or yellow on the concealed surfaces of the hind legs and is slightly smaller (1¾ to 3 inches). The pickerel frog has a characteristic odor and secretes a strong poison from its skin glands. Otherwise, its habits are almost identical to those of the leopard frog, but the pickerel frog is the much less common of the two.

The least aquatic of all our frogs is the aptly-named wood frog, which prefers to spend most of its life wandering widely through damp woodlands, returning to the water only to breed. It is a small (1¼ to 2¾ inches) brown frog with white underparts and a black eye mask. The wood frog is among the first of the frogs to spawn in the spring, arriving in the ponds immediately after the spring peepers. Its tadpoles mature by the middle of the summer and the small frogs immediately leave the water until they are ready to come back to spawn. While rarely seen due to its secretive habits and protective colors, the wood frog is probably much more common than is suspected, although destruction of its upland habitat must surely have decreased its numbers in recent years.

## **5. Birds**

Mashpee's bird species may be roughly broken down into four types: permanent residents, transients, winter visitants and summer residents. A permanent resident is a species of bird which is found in the town throughout the year. Transients are birds which winter south of Mashpee and nest north of the town. They only appear as migrants, transiently, in the spring and fall. Winter visitants are birds which nest to the north of Mashpee and come south to spend the winter here. They are not present during the summer months, but only during the winter. Summer residents are birds which winter south of the town and come north in the summer to breed here. They are not found here in the winter, but nest here every year.

Mary Keleher, president of the Cape Cod Bird Club and a Mashpee DPW employee, has compiled a bird checklist for Mashpee which indicates those confirmed breeding in the town, as well as the frequency that they can be found during each season. Other information sources include the Massachusetts Breeding Bird Atlas, studies done at South Cape Beach and for the Waquoit Bay National Estuarine Research Reserve and Sargent's 1931 survey of the Mashpee River.

A number of Mashpee's bird species are listed by the state as endangered, threatened or of special concern.

The American Bittern (*Botaurus lentiginosus*), currently listed as endangered, is a 23-34 inch long brown, streaked, ground-dwelling heron which spends most of its time hidden among tall marsh plants such as cattails, bulrushes, sedges and grasses in fresh water or brackish wetlands. It was reported in a census of birds at South Cape Beach in 1983.

The Northern Harrier (*Circus cyaneus*), or Marsh Hawk, is listed by the state as threatened. It is a slim, long-legged, long-tailed hawk, about 16-24 inches in length with a wingspan of up to 46 inches. They are regularly found in coastal marshes during the fall, winter and spring, but rarely spend the summer. Voles are favored prey.

The Piping Plover (*Charadrius melodus*) is listed as threatened by both the state and federal endangered species programs and has been the subject of a major recovery effort. Because it builds its nest in the narrow band of sand between the high tide line and the foot of coastal dunes, it comes into conflict with human recreational activities here on the Cape during its March to June nesting season. Because its eggs are so well camouflaged by their sandy coloration, they are often unintentionally crushed by off-road vehicles and pedestrians on the beach. As a result, beach closures are often necessary to allow successful hatching. Predation by foxes, skunks, raccoons and other predators is also a problem, which has been fairly successfully dealt with by the placement of temporary wire enclosures surrounding nest sites. In Mashpee, plovers nest on Popponeset Spit and at South Cape Beach.

The Upland Sandpiper (*Bartramia longicauda*), state-listed as endangered, inhabits large expanses of open grassy uplands such as those found near the runways at Otis Air National Guard Base. It is about 12 inches tall, with a 25-27 inch wingspan and has a small head, shoe-button eyes, short and thin dark brown bill, a long thin neck, relatively long tail and long yellowish legs. The crown is dark brown with a pale buff crown stripe, and the rump, upper tail and wings are much darker than the rest of the bird.

The Roseate Tern (*Sterna dougallii*) is both state and federally listed as endangered. This 13-16 inch bird with black cap, orange legs, black bill and long white tail streamers, arrives in the spring, most often seen at Popponeset Spit along with Common Terns.

The Common Tern (*Sterna hirundo*) is slightly smaller, at 12-14 inches, and more numerous than its Roseate cousin, with a black-tipped orange bill and shorter tail. It is listed as a species of special concern by the state. There has been an active colony on Popponeset Spit.

The Least Tern (*Sterna antillarum*), also state-listed as a species of special concern, occupies the same nesting habitat and suffers from the same problems as the piping plover. It is 8-9 inches long, with a black cap and white eye stripe, and yellow-orange legs and bill.

The Barn Owl (*Tyto alba*) lacks the feathered ear tufts of our other owls, having a distinctive heart-shaped face and dark eyes. A species of special concern, it requires grassy habitats, like salt marshes, and plenty of meadow voles, its main food source. It nests in hollow trees, cavities in cliffs or river banks and in artificial structures such as nest boxes, old barns and bridges. It is not easily seen due to its nocturnal hunting habits, with most hunting activity occurring between an hour after sunset and an hour before sunrise. The state lists its most recent observation of this bird as 1991.